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HEADQUARTERS
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MILITARY SATELLITE PROGRAMS PROGRESS REPORT
Month Ending 30 November 1960
DD-DR&E(M) 397

FOREWORD

Attached are the reports covering progress during the month of November 1960 for the DISCOVERER and MIDAS Programs. These reports are directed by Secretary of Defense memorandum to the Secretary of the Air Force, dated 27 February 1960.

O. J. RITLAND
Major General, USAF
Commander

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1. ~~(S)~~ DISCOVERER Program
2. ~~(S)~~ MIDAS Program

When inclosures are withdrawn this classification of this correspondence will be down graded to UNCL in accordance with AFR 205-1.

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DISCOVERER PROGRAM

1. This report, covering progress during the month of November 1960, is submitted in accordance with Department of Defense memorandum to the Secretary of the Air Force, dated 27 February 1960.

2. **FLIGHT TEST STATUS**

a. DISCOVERER XVII Flight

(1) DISCOVERER XVII was launched from Vandenberg Air Force Base at 1242 PST on 12 November. An attempt to launch on the previous day was cancelled because of propellant loading and umbilical problems. The ascent was satisfactory except that the injection altitude was slightly low and the period of the satellite orbit was approximately 2-¼ minutes longer than planned. The extended satellite period had little effect on satellite operation or the recovery, except to make the alternate (thirty-first) pass more desirable for recovery operations than the nominal (thirty-second) pass.

(2) This was the first AGENA "B" satellite to be orbited and the second AGENA "B" to be launched. This was also the first attempt to recover a capsule after two days in orbit; all other attempts were made after one day. The recovery was also a "perfect" catch - the first caught at the predicted impact point.

(3) Recovery forces were deployed in the predicted impact area on 14 November. At 1431 hours, after nearly 51 hours in orbit, the capsule in DISCOVERER XVII was ejected over Alaska. Satellite attitude at ejection was two degrees left and fifty-nine degrees down, which is close to the optimum position. Capsule spin, retro-thrust and de-spin were near nominal. Initial acquisition of the capsule beacon transmitter signal was made by one of the C119J aircraft in the recovery force at 1434 PST. Nine minutes later, the descending parachute and capsule were sighted by Pelican II. During the first pass the grappling hooks struck the capsule but did not snag it. The second pass was successful. The capsule was undamaged, except for some scorching of the cover by aerodynamic heating during re-entry.

b. DISCOVERER XVII Experiments

(1) Several biomedical experiments were carried on DISCOVERER XVII and the data obtained are expected to provide important information on the space environment. Only preliminary results are available, but indications are that all experiments were successful.

(2) A densiometer mounted in the forward equipment compartment of the satellite revealed a greater density of gases in the compartment

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than were expected. Some differential gas pressure between the vacuum conditions of space and the interior of the satellite was expected. This would be caused by the outgassing of paint, insulation and other materials together with the fact that in near-vacuum conditions gases cease to flow and are lost only by random escape of separate molecules. However, the unexpectedly high differential pressure discovered in DISCOVERER XVII could have a significant effect on the design of future space vehicles. Because of this increased density, densiometers will be carried on several future DISCOVERER flights to provide additional data and verify these initial findings.

(3) As part of an extensive program being carried out by the Air Force and several governmental agencies for development of super-precise tracking systems, tracking lights were carried aboard the DISCOVERER XVII satellite. The lights were photographed against a star background by optical tracking equipment in the Netherlands West Indies, Japan, India, Iran, Florida, and New Mexico. The data from this and other DISCOVERER flights employing the tracking lights will be used to develop a very precise earth-space positioning system against which other tracking devices (radar) can be calibrated.

c. DISCOVERER XVIII Flight

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On 10 December, after three days in orbit, the capsule of DISCOVERER was recovered by one of the recovery aircraft. Biomedical experiments were carried aboard this vehicle and results of this flight and DISCOVERER XVII will be compared. The first four-day recovery mission for a DISCOVERER satellite is scheduled for launch in January 1961.

d. DISCOVERER XIX

This vehicle is undergoing tests in the Vandenberg Air Force Base missile assembly building. The launch is presently scheduled for mid-December. DISCOVERER XIX will carry a radiometer designed to gather background infrared radiation data for the MIDAS Program. Another radiometric measurement flight is scheduled for early next year. These two satellites will not carry recoverable capsules.

3. TECHNICAL PROGRESS

a. Second Stage Vehicles

Several additional XLR-81Ba-9 engine tests were completed as part of the reliability program. XLR-81Ba-9 engine number 306 was used for these tests. A new thrust chamber was installed for these tests. The previous chamber was removed after 2,600 seconds of operation so that statistical data can be gathered on more than one thrust chamber.

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b. **Biomedical Test Program**

A full-duration test was conducted beginning 7 November simulating a one-day mission with a live monkey in the life cell of a Mark II biomedical capsule. This test was successful in sustaining the animal in a healthy condition under simulated orbital conditions. On 8 November, after nearly 29 hours in a simulated space environment, the capsule was removed from the chamber and shortly after midnight, the animal was removed from the capsule in good condition.

c. **Facilities**

A tracking station is being built for installation on Tern Island, which is located approximately 500 miles northwest of Hawaii. This station will be used for automatic tracking and data acquisition of re-entry vehicles during recovery operations. The installation, which is scheduled to be operational by mid-December, will consist of a tracking and data van and a communications and control van.

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MIDAS PROGRAM

1. This report, covering progress during the month of November 1960, is submitted in accordance with Department of Defense memorandum to the Secretary of the Air Force, dated 27 February 1960.

2. **PROGRAM ADMINISTRATION**

a. The preliminary version of the MIDAS Operational System Description has been completed. This document presents a description of the complete operational system as presently conceived. Following review by AFBMD, the final version will be prepared.

b. A proposed MIDAS Development Plan dated 24 October was presented to the Air Force Ballistic Missile Committee on 4 November. Guidance has been received from the Secretary of the Air Force recommending a revised presentation of the Development Plan. The Development Plan will be resubmitted to the Secretary of the Air Force in the very near future.

3. **FLIGHT TEST STATUS**

a. Delivery of the AGENA "B" vehicle for the third MIDAS flight from the system test phase of manufacturing has been delayed two weeks because of continued component difficulties. An extremely small number of modifications remain to be accomplished. An intensive schedule recovery program has been developed which calls for completing the systems test activity on 22 December and for shipment from Santa Cruz Test Base on 13 January. This Santa Cruz completion date represents a slippage of two days from the last scheduled delivery date and, if attained, will not appreciably affect the launch schedule for MIDAS III.

b. The radiometer for the RM-1 flight (DISCOVERER XIX) was delivered to Vandenberg Air Force Base on 18 November. The radiometer will enter systems testing for compatibility with the satellite vehicle on 29 November. This radiometric measurement flight is presently scheduled for 15 December. A second flight is scheduled for early 1961. The purpose of these flights is to gather background infrared radiation data.

4. **TECHNICAL PROGRESS**

a. Second Stage Vehicles

(1) The AGENA "B" vehicle for the fourth MIDAS flight was delivered to the systems test area on 25 November. This represents a one week schedule slippage. It is anticipated that this time will be recovered during the systems test phase. The horizon sensor is scheduled for

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delivery on 28 November. The sensor will be installed in the satellite during the systems test phase.

(2) The fifth MIDAS satellite is currently in final assembly and is on schedule. It will be delivered to systems test on 6 December.

(3) Authorization has been obtained for installation of a 400-mc transmitter beacon in the satellite vehicles for MIDAS III, IV and V. This transmitter, which will have its own battery pack and antenna, will provide approximately a 20-milliwatt signal for antenna acquisition and automatic tracking by the mobile ground station located in South Africa. This station will provide a minimum interim capability for second burn telemetry data readout, which is a mandatory requirement. Establishment of this interim capability was made necessary because of the inability to obtain right-of-entry to establish the Atlantic Missile Range station 13 capability in Southeast Africa.

(4) Manufacture of the instrumentation package which will measure nuclear radiation in the Van Allen belt is on schedule. This package is scheduled for installation in the MIDAS III satellite vehicle on 15 December.

b. Infrared Scanners

(1) The payload for the third MIDAS flight has satisfactorily completed the test program conducted in the high altitude temperature simulation chamber. The payload for the fourth MIDAS flight is scheduled for delivery in December.

(2) The infrared detectors to be used on the service test model of Aerojet-General's advanced infrared payload configuration are being provided on a competitive basis by Infrared Industries and Electronic Corporation of America. Delivery of detectors from both contractors continues to be a problem. Aerojet has assigned a resident representative to follow and expedite the program.

(3) A cost contract has been negotiated for seven payloads of the advanced configuration being developed for MIDAS flights 6, 7, and 8. Five are programmed as flight articles and spares and two for life testing in the accelerated reliability program.

(4) The technical and engineering evaluation of the proposed all-electronic infrared scanner system has been completed. The results of this evaluation have been very encouraging. A final decision is pending on whether to proceed with the development effort on this system.

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c. **Ground Support Equipment**

The initial Baird-Atomic, Inc., ground presentation unit, which will be used in support of MIDAS flights 3, 4 and 5 has been delivered. The equipment is currently being installed in the Satellite Test Center. A second ground presentation unit, for installation at Vandenberg Air Force Base, is scheduled for delivery in December.

d. **Facilities**

(1) Completion of all support facilities at Fort Greeley, Alaska, is scheduled during December. The Donnelly Dome microwave relay station is scheduled for completion on 15 December.

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(4) Construction of facilities at the New Boston, New Hampshire station is proceeding on schedule toward a 30 December completion date.

(5) All previously initiated construction and/or modifications at the Vandenberg Air Force Base station have been completed. A study is underway to validate the requirement for an addition to the Data Acquisition and Processing Building.

(6) Modifications to the Point Arguello launch stand No. 2 have been rescheduled to accommodate the MIDAS/AGENA "B" launch scheduled for February.

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